VGA Controller Game of Life

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UART

- UART is bi-directional, very useful for debugging. We can dump memory regions on the serial port.

Multiplexing of image rendering and Game of Life

- We have 3 modes:
  - Displaying images
  - Game of Life
  - Transferring data on serial port (display « Snow » Effect)
- First byte of data stream indicates mode:
  - 0x01 Game of life
  - 0x02 Image display

Memory and Speed

- You can reload as many times as you want a new data file (you can thus switch back and forth from image display to game of life)
- Speed 640 x 480 @ 60 Hz
- For game of life: swap between 2 memory regions.
- For image display: 4 bits per pixel (1 bit ignored)

Game of Life

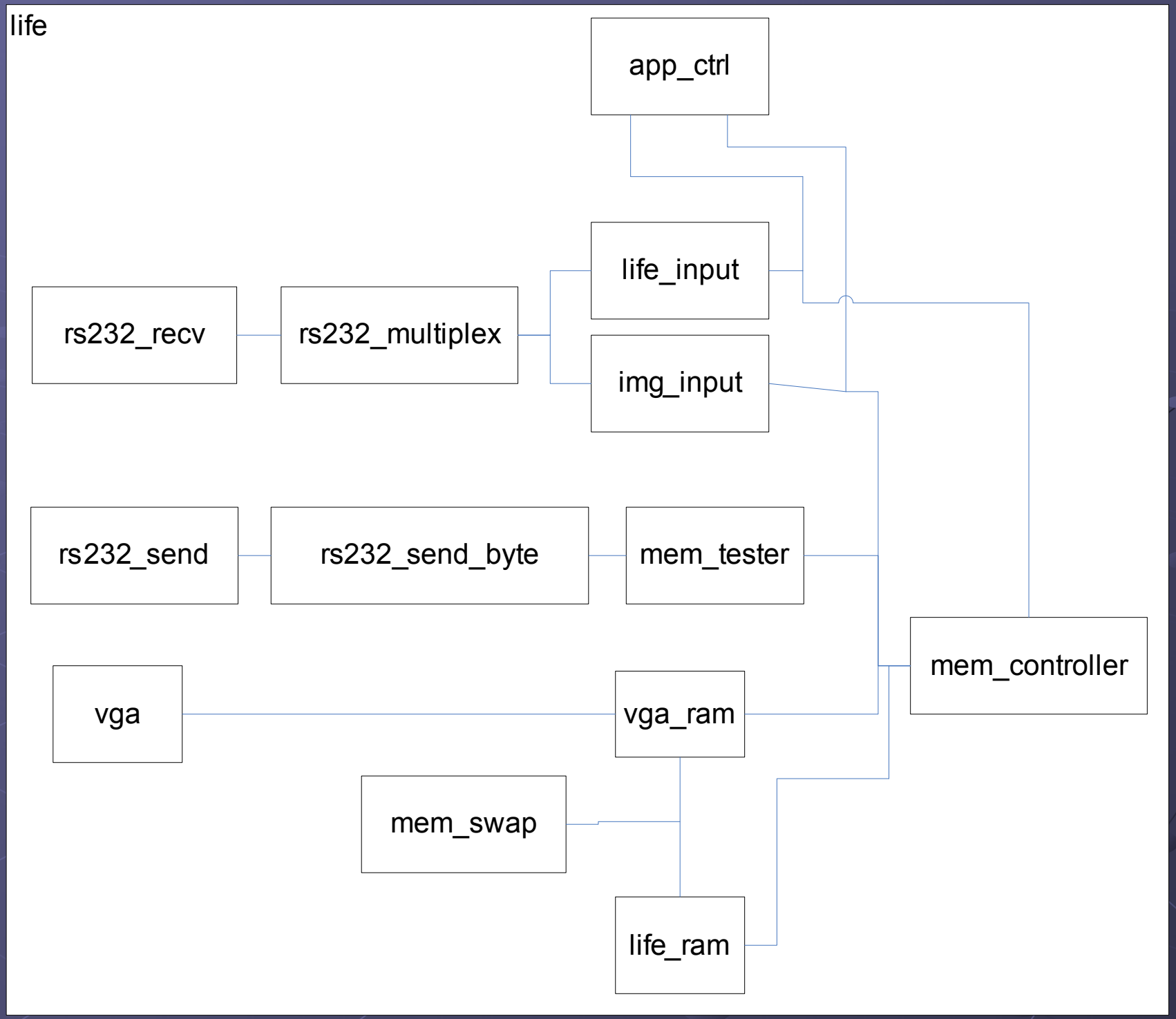
- We calculate each new generation by loading 9 x 32 bits, calculating (in parallel) 32 cells followed by saving 32 bits.
- For 32 clock cycles we use 23 for the Game of Life and 2 for VGA. This synchronization is done via a shared counter.

Mem_controller

- We have a memory controller that controls the RAM access by the 5 units:
  - img_input (writing data arriving from serial port)
  - life_input (writing data arriving from serial port)
  - life_ram (read current and write new generation)
  - mem_tester (dump memory on serial port)
  - vga_ram (read data to display on monitor)
- Priority based (actually unused)
- Ack signal, very useful for debugging
- Could have been used for VGA <> life synchronization

Java GUI

- We wrote a Java GUI to resize and change colors for images and create/ transfer life patterns.
- Unfortunately the GUI isn’t finished.


life
app_ctrl
life_input
rs232_recv
rs232_multiplex
img_input
rs232_send
rs232_send_byte
mem_tester
mem_controller
vga
vga_ram
mem_swap
life_ram